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ABSTRACT

The effects of closed-captioned educational video as an instructional tool for improving reading comprehension and learning retention for students in college developmental studies programs were studied. Subjects were 168 students in Developmental Studies English and reading classes at a regional university in the Southeast and 168 first-year students in regular core courses. A 30-minute closed-captioned video from the Civil War series produced by Ken Burns was the treatment material. A multiple-choice test was used as pretest, posttest, and retention test (at 4 weeks). The video was used with and without the captioning, audio, and an accompanying printed text. The developmental studies students knew less about the Civil War at entry and never caught up with their core subject peers. None of the treatment conditions raised posttest and retention test scores. Explanations for these results are explored. Two tables and three figures present study data. (Contains 23 references.) (SLD)

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ED 373 733

Title:

Closed-Captioned Educational Video: Implications for Post-Secondary Students

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Over 40% of freshmen entering public technical schools, colleges and universities are seriously deficient in reading, English skills, and mathematics skills. Many students are unable to improve and eventually drop-out of college, despite remedial efforts. This study used closed-captioned videotape as a technological approach to improving learning and retention skills in college students with deficiencies in reading. An experimental group of 168 Developmental Studies College students, along with 168 comparison academic core education students, were exposed to one of six treatments (i.e., closed-captioned video with sound, regular video with no captioning, closed-captioned video with no sound, audio tape with print, audio tape without print, and print only). Data gathered were pretest, posttest, and retention test scores.

Even though gains were made in posttest and retention test scores for Developmental Studies students in all treatments, they never achieved to the level of their academic peers. When examining individual treatments, the use of closed-captioned video was significantly better than other treatments for academic core students; however, for Developmental Studies students, this treatment produced the poorest scores for the posttest and second poorest for the retention test.

This study suggests learning through multi-sensory instructional media, such as that commonly employed in academic core college classrooms, is more difficult for the Developmental Studies student.

INTRODUCTION

A substantial portion of college students' academic competency is reflected in reading and English skills. Deficits in reading and English usage result in poor academic achievement, which leads to academic probation and subsequent withdrawal. There are no winners when a college student struggles in reading and writing. Students who drop out of college because of reading and writing deficits will find employment in lower-paying positions (Johnson, 1987; Kerachsky & Thornton, 1987; Rusch & Phelps, 1987).

Developmental studies and student support programs are designed to provide academic support to students who are underprepared in the basic fundamentals of reading, writing, mathematics, and study skills. Many enter college lacking appropriate secondary school coursework, but some of these students have disabilities. The majority of post-secondary students with a disability are learning disabled; however, many never inform the college of their disability, fearing a stigma will be placed on them (Henderson, 1992). Additionally, college programs have no standard definition of learning disabilities (Wallace & McLoughlin, 1988).Thus, it is common for students to be inappropriately served, underserved, or to receive no support services at all.

Despite efforts by most colleges and universities, traditional student support programs that require specialized classes are not highly successful. Numbers of students "exiting" these programs can be misleading, for many simply drop out of college (Whinnery, 1992). There are indications numbers of students needing remediation are increasing. Since the end of 1970, the percent of freshmen who report having a disability has tripled. Additionally, the disabling conditions that are most prevalent today are more likely to be invisible (e.g., learning disabilities, health impairments, communication deficits, low vision, or hearing impairments) than obvious disabilities (e.g., deafness, blindness, physical) (Henderson,1992) . New provisions for appropriate student access and support under the 1990 Americans with Disabilities Act challenge colleges and universities to examine more efficient and effective ways to deliver appropriate learning environments, methods, and materials to students who desire a higher education.

Reading skills for college students are essential forsuccess. English and reading programs should: (a) emphasize critical thinking, (b) build students' elaboration skills, (c)

advance readers' abilities to interpret, and (d) afford opportunities to form opinions with reasoned support (Applebee, Langer, & Mullis, 1988). In order to achieve these goals, students must develop fluency in reading as well as comprehension skills. Carver and Darby (1972) believe these two skills are inseparable. They define reading comprehension as:

> ...a thorough communication process which involves two primary components -- the rate at which the thoughts are received and the accuracy with which the thoughts are understood. The end product of these two components is the efficiency with which the thoughts are communicated (p.292).

Poor reading comprehension is usually the first academic identifier that a student may have a specific learning disability. (Smith & Luckasson, 1992, p. 217). For these students who stay in school until their senior year, their average academic achievement in reading is at the fifth grade level (Schumaker, Deshler, Alley, & Warner, 1983). Therefore, students who have learning disabilities are reading at approximately this level when they enter college. To ensure success at the college level, new methods and materials must be developed to address learner diversity through media, such as instructional video (Hofmeister, 1992). Closed-captioned educational videotape used to instruct college students who are underprepared or have disabilities may prove to be a powerful alternative or addition to traditional support methods.

Much of the current research with closed-captioned video has been done with hearing impaired populations (Koskinen, Wilson, & Jensema, 1985; Montandon, 1982; Sherman & Sherman, 1989) and with persons who use English as a Second Language (ESL) (Markham, 1989; Spanos & Smith, 1990). Results are encouraging that closed-captioning is effective in enhancing learning and improving literacy skills.

The majority of reading studies that examined closed-captioned materials was conducted with students in elementary grades (Brashier-Spath, 1989; Koskinen, Wilson, Gambrell, & Neuman, 1993; Beentjes & Van Der Voort, 1988; Goldman & Goldman, 1988). Improvement in vocabulary, reading comprehension, writing skills, and reading rates was reported. Based on these studies, effects of closed-captioned materials for reading deficient post-secondary students are examined. Can post-secondary students who have intense reading task demands do better using closed-captioned video media?

The purpose of this study was to examine the effects of closed-captioned educational video as an instructional tool to improve reading comprehension and retention of learning.

METHOD

Subjects

This study included 168 students enrolled in Developmental Studies curriculum (English and Reading classes) and 168 students from Regular academic core courses (School of Education classes). All subjects were first year students at a regional university in the Southeast.

Subject selection for the Developmental Studies students was based on criteria from the Freshmen Evaluation for Developmental Studies, an evaluation tool comprised of writing samples and test scores. Students scoring below 400 on the Scholastic Aptitude Test (SAT) Verbal and below 75 on the Collegiate Placement Exam reading and English subtests were included in the subject pool. All students who participated in the study volunteered.

The Regular academic core course students met college admission standards and had SAT Verbal scores at 400 or above and scored 75 or above on the Collegiate Placement Exam in reading and English subtests.

There were significantly more African-American Developmental Studies students than Regular academic core students who volunteered for the study. Additionally, there were significantly more females in the Regular academic core group than males. These differences also reflect numbers of students in the subject pool.

Insert Table 1: Demographic Data here

Materials

A thirty minute edited closed-captioned video from *The Civil War*: *Episode One, The Cause — 1861* (Burns, 1990) was the treatment material. Narration of the video was recorded on audio cassette as well as transcribed in printed form. Materials needed to administer treatments were: 2 TeleCaption 4000 closed-captioned decoders, 2 audio cassette players, 3 Panasonic BT-S1300N color video monitors, and 3 Sharp XA-305 video cassette players. Text was double spaced and administered in bound booklets.

Measures

Based on the edited video, a 33-item multiple choice test was constructed and used as a pretest, posttest, and retention test. The items tested subjects' ability in decoding single words, understanding vocabulary, interpretation of sentences (including appreciation of morphology and syntax), identifying main ideas, identifying supporting details, rejecting irrelevant or distracting information, retelling a passage, identifying the author's intention and/or point of view, and summarizing. These are considered relevant parameters of reading comprehension necessary for reading success (Levine, 1987, p. 298).

Experimental Design

The experiment was a 2 x 6 x 3 (Group x Treatment x Test Scores) within factor design using treatment and test scores as factors. Two groups were Developmental Studies students and Regular academic core curriculum students. Three tests were pretest, posttest, and retention test. Six treatments and their descriptions were:

CC Closed-Captioned Video.
Students receiving this treatment viewed a video with sound having closed-captioned text shown at the bottom of the video monitor.

V Sound Video.
Students receiving this treatment viewed a regular video with no captioning.

CM Muted Closed-Captioned Video.
Students viewed a video with captioned text but the audio portion was muted. The purpose of this treatment was to test subjects' visual sensory adapting capability when the situation required them to process complex information (video and captioned text) when audio sensory mode was artificially disabled.

A Audio Media.
Video narration was recorded on an audio cassette tape format.

AP Audio and Printed Media.
Students receiving this treatment listened to audio tape narration as well as read the printed narration at the same time.

P Printed Media.
Students read a printed text transcribed from the video narration. (This treatment served as control.)

Based on the grouping and treatment assignment described above, a grouping chart is depicted as follows:

Insert Figure 1: Grouping Chart here

This study examined the following questions:

1. Between groups, do Developmental Studies students perform differently from Regular academic core curriculum students in their mean pretest scores, mean posttest scores, and mean retention test scores? (DS vs RA)

2. Between groups, do Developmental Studies students and Regular academic core curriculum students receiving the same treatment perform differently in their mean pretest scores, posttest scores, and retention test scores? (1 vs 7, 2 vs 8, 3 vs 9, 4 vs 10, 5 vs 11, and 6 vs 12)

3. Within groups, are there differences among groups of subjects who received different treatments in their mean pretest scores, mean posttest scores, and mean retention test scores? (1 vs 2 vs 3 vs 4 vs 5 vs 6, and 7 vs 8 vs 9 vs 10 vs 11 vs 12).

4. Within groups, are there differences among groups of subjects who received closed-captioned video, regular video, and printed media in their mean pretest scores, mean posttest scores, and mean retention test scores? (1 vs 2 vs 3, and 7 vs 8 vs 9)

5. Within groups, are there differences among subjects who received the closed-captioned with sound video treatment from subjects who viewed the sound video treatment in their mean pretest scores, mean posttest scores, and mean retention test scores? (1 vs 2, and 7 vs 8).

Procedures

All subjects were given a 33-item pretest on the topic *The Civil War: Episode One, The Cause — 1861* (Burns, 1990) containing information presented in the treatment session. Those scoring 80% correct and higher on the test were eliminated from the study because they had mastered the instructional materials. After the subject pool was identified, a Pilot Study was conducted with 36 students to correct any errors and modify treatment materials.

In the Experimental Study volunteer students in Developmental Studies curriculum and students in Regular academic core courses were randomly assigned to one of the six types of treatment listed above. For both groups, each cell contained 25 students. Immediately after treatment, subjects were given a posttest with the same 33-item multiple choice test items used in the pretest. Four weeks after the posttest, the subjects were given the same 33-item multiple choice test as a retention measure. All data was analyzed and interpreted to answer the experimental questions stated above.

RESULTS

The dependent variables for the study are mean pretest scores, mean posttest scores, and mean retention test scores. Test items of the pretest, posttest and retention test were constructed in a multiple choice format.

Based on the experimental questions stated in Design section under Method, all data were analyzed using the following statistical analysis procedures with a significance level set at a = .05. Statistical analyses of all data in this investigation were performed through the use of SAS statistical software.

Question 1: Multivariate analysis of variances (MANOVA) was used to test group differences.

Question 2: Profile analysis was conducted to test group by treatment interaction effect. If significant differences were found, treatment analysis was performed using oneway ANOVA and contrast analysis.

Question 3: Profile analysis was conducted. If significant differences were found, a oneway ANOVA for each group was performed, with post hoc comparisons of means via the Tukey-B test.

Orthogonal contrast analyses were conducted on both Question 4 and Question 5.

Analysis of Covariance (ANCOVA) procedures were conducted on the after-treatment measures of mean posttest scores and mean retention test scores. The covariate for the mean posttest scores was the mean pretest scores. Both mean pretest scores and mean posttest scores were used as covariates for the analysis of mean retention test scores differences.

Mean scores of students' performances on pretest, posttest, and retention tests are listed in Table 2.

Insert Table 2: Means Table here

Question #1

A multivariate analysis was performed. Group differences were found on all measures (i.e., pretest, posttest, retention test). Developmental Studies students scored statistically below their Regular Enrolled peers before and after treatment. See Figure 2.

MANOVA for Question 1
Dependent Variable: Pretest.

Source	DF	SS	MS	F	p
GROUP	1	1172.16	1172.16	87.08	<.001
ERROR	298	4011.23	13.46		
TOTAL	299	5183.40			

Dependent Variable: Posttest.

Source	DF	SS	MS	F	p
GROUP	1	2670.08	2670.08	132.91	<.001
ERROR	298	5986.75	20.09		
TOTAL	299	8656.84			

Dependent Variable: Retention Test.

Source	DF	SS	MS	F	p
GROUP	1	2144.01	2144.01	119.90	<.001
ERROR	298	5328.93	17.88		
TOTAL	299	7472.95			

Insert Figure 2: Group Comparison of Three Measures here

Question #2

The following measures were performed: For the pretest measure, group by treatment ANOVA; posttest, group by treatment ANCOVA using pretest as the covariate; retention test, group by treatment ANCOVA using pretest and posttest scores as covariates.

The results of the analyses on the three measurements show group differences but no treatment or group by treatment interaction effects. Developmental Studies students' scores were significantly lower than Regular Enrolled students scores for all measures.

Question #3

(For Questions #3, #4, #5, the analyses were performed to determine treatment effects within groups.)

The following measures were performed: For the pretest measure, one-way ANOVA; posttest, one-way ANCOVA using pretest as the covariate; retention test, one-way ANCOVA using pretest and posttest as covariates.

For Developmental Studies students, no treatment differences were found in pretest and posttest scores. There was a significant difference in retention test scores. Tukey's Studentized Range Test indicated students who received muted video and those who received printed media scored better than those who received closed-captioned video and audio only. See Figure 3.

Insert Figure 3: Selected Treatment Comparison of Developmental Studies Students' Measures here

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For Regular Enrolled students, no treatment differences were found in pretest scores. There was a significant difference in posttest scores. Tukey's Studentized Range Test indicated students who received audio print scored higher than those students who received print only and audio only treatments. There was a significant difference in retention scores. Tukey's Studentized Range Test indicated students who received audio print and closed-captioned treatments scored significantly higher than those students who received print only treatment.

ANOVAs & ANCOVAs for Question 3

Dependent Variable: Retention Test (Developmental Studies Students).

Source	DF	SS	MS	F	p
TREAT	5	178.37	35.67	5.57	<.001
Pretest	1	408.29	408.29	63.72	<.001
Posttest	1	620.95	620.95	96.91	<.001
ERROR	142	909.88	6.41		
TOTAL	149	2117.49			

Dependent Variable: Posttest (Regular Enrolled Students).

Source	DF	SS	MS	F	p
TREAT	5	231.60	46.32	3.67	<.01
Pretest	1	1205.69	1205.69	95.44	<.001
ERROR	143	1806.47	12.63		
TOTAL	149	3243.76			

Dependent Variable: Retention Test (Regular Enrolled Students).

Source	DF	SS	MS	F	p
TREAT	5	115.20	23.04	3.71	<.01
Pretest	1	1373.01	1373.01	221.10	<.001
Posttest	1	841.42	841.42	135.50	<.001
ERROR	142	881.80	6.21		
TOTAL	149	3211.44			

Question #4

The following measures were performed: For the pretest measure, one-way ANOVA; posttest, one-way ANCOVA using pretest as the covariate; retention test, one-way ANCOVA using pretest and posttest as covariates.

For Developmental Studies students, no treatment differences were found in pretest and posttest scores. There was a significant difference in retention test scores. Tukey's Studentized Range Test indicated students who received print only scored better than those who received closed-captioned video.

For Regular Enrolled students, no treatment differences were found in pretest and posttest scores. There was a significant difference in retention scores. Tukey's Studentized Range Test indicated students who received closed-captioned treatments scored significantly higher than those students who received print only treatment.

ANOVAs & ANCOVAs for Question 4

Dependent Variable: Retention Test (Developmental Studies Students).

Source	DF	SS	MS	F	p
TREAT	2	68.59	34.29	4.94	<.01
Pretest	1	148.08	148.08	21.35	<.001
Posttest	1	313.20	313.20	45.16	<.001
ERROR	70	485.52	6.94		
TOTAL	74	1015.39			

Dependent Variable: Retention Test (Regular Enrolled Students).

Source	DF	SS	MS	F	p
TREAT	2	60.03	30.01	5.20	<.01
Pretest	1	597.81	597.81	103.51	<.001
Posttest	1	346.88	346.88	60.06	<.001
ERROR	70	404.27	5.78		
TOTAL	74	1408.99			

Question #5

The following measures were performed: For the pretest measure, one-way ANOVA; posttest, one-way ANCOVA using pretest as the covariate; retention test, one-way ANCOVA using pretest and posttest as covariates. No treatment differences were found in pretest, posttest, and retention test scores for both Developmental Studies and Regular Enrolled students.

DISCUSSION

Examination of data from baseline measures to determine differences between Developmental Studies college students and Regular academic core students revealed Developmental Studies students knew less about Civil War history than their peers. These students would appear to have less command of information expected of students who enter college.

This study suggests that using different instructional media may not be effective in bringing Developmental Studies students to the level of their peers. Even though gains were made in posttest and retention test scores in these students, they never caught up in level of achievement with their academic core peers. None of the six uses of instructional media (i.e., closed-captioned video, sound video, muted closed-captioned video, audio media, audio and printed media, and printed media) was successful in raising posttest and retention test scores of reading deficient students equivalent of their peers. A body of research in learning disabilities suggest these children never catch up to their nondisabled peers, no matter what interventions are given. This research with students having reading deficts appears to support those findings with learning disabled children. However, after examining differences within groups, results do not give a clear picture explaining why Developmental Studies students do not learn or retain as much information as their Regular college peers. These results might suggest students who have reading deficits prefer instructional strategies that require one sensory mode when using cognitive skills required in reading, while those who do not have deficits can more easily utilize both visual and auditory senses to more efficiently process and retain information.

Other explanations for these differences can be derived from looking at the data for retaining information using closed-captioned video, sound video, and printed media. Developmental Studies students retained more information when given printed text. They performed worse when learning through closed-captioned video. However, the opposite happened for Regular academic core college students. They retained more learning through closed-captioned video than print media.

These results suggest more is involved than sensory overload. If that were the case, Developmental Studies students would not be significantly different from their peers in their posttest and retention test scores for those treatments involving only visual or auditory learning. This was not the case. Perhaps Developmental Studies students are deficient in metacognitive skills of "knowing how to learn." Research supports that children with learning disabilities lack metacognitve skills essential in reading; yet, the majority of the Developmental Studies students in this study were not identified as having a learning disability. These findings suggest Developmental Studies students may share some of the same deficits as students with learning disabilities and may be better served by colleges and universities with methods and materials designed for students with learning disabilities.

This study suggests learning through multi-sensory instructional media, such as that commonly employed in academic core college classrooms, is more difficult for the Developmental Studies students. However, the finding that Developmental Studies students who received muted closed-captioned treatment retained information more than their same peers who received other treatments suggests that two learning modalities (i.e., printed word and visual) are effective and that the addition of the third modality (i.e., sound) may interfere with learning and retention.

More research should be conducted to determine why closed-captioned video appears to be the most effective instructional media for learning retention with students who do not have reading deficits. The results of this study seem to have identified another factor that can make closed-captioned video highly successful for one group and not effective for another. Of particular importance may be the speed of the prompt rate. These prompt rates are designed for hearing impaired persons who are considered to be competent readers. Therefore, a person deficient in reading skills may not be able to keep up with a fast prompt rate, could become easily frustrated, and, therefore, not learn. This research needs to be replicated with prompt rates modified to more closely match reading level and comprehension rate assessed in students with deficient reading skills.

The use of technology in the classroom is being promoted in education at all levels; however, this study clearly points out that introduction of technology can have detrimental effects when not closely examined. Using closed-captioned video is supported through this research as being an effective instructional method for students without reading deficits. With more research, this could also prove true for those who struggle to learn through reading, such as students in Developmental Studies, in special education programs, and in Chapter I reading programs.

At this time we do not know why all students did not respond positively to closed-captioned videotape. Therefore, the results of this study should be interpreted cautiously. More research is needed with a larger number of students with reading deficits. Additionally, closed-captioned video technology needs to be responsive to allow for more manipulation in order to more clearly examine its power.

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Table 1: Demographic Data

		Developmental Studies	Regular
Gender			
	Female	97	128
	Male	63	22
Race			
	Black	67	17
	White	81	130
	Other	2	3
Age			
	Mean	21.73	24.59
	Standard Deviation	5.78	6.27

TABLE 2: Group, Treatment, and Group by Treatment Means

		Pretest	Posttest	Retention Test
GROUP				
	Dev. Studies	11.22[a]	16.99	15.17
		3.22[b]	4.29	3.77
	Regular	15.73	22.96	20.52
		4.07	4.67	4.64
TREATMENT				
	CC	12.70	20.00	17.72
		4.40	5.67	5.70
	V	13.18	19.86	17.78
		3.95	4.63	4.69
	CM	13.24	20.00	18.22
		3.94	5.03	4.00
	A	12.94	19.04	17.14
		4.21	5.54	5.96
	AP	14.20	20.74	18.42
		4.53	6.43	5.49
	P	12.92	20.22	17.80
		3.96	4.92	3.92
GROUP by TREATMENT (Developmental Studies)				
	CC	10.28	16.24	14.12
		3.16	4.66	4.17
	V	11.08	16.92	15.00
		2.56	3.62	3.32
	CM	11.64	16.96	16.68
		2.69	3.49	2.98
	A	10.56	16.72	13.72
		3.58	3.84	3.79
	AP	11.84	16.40	15.08
		3.52	5.34	4.25
	P	11.92	18.72	16.44
		3.58	4.47	3.33
GROUP by TREATMENT (Regular)				
	CC	15.12	23.76	21.32
		4.18	3.82	4.68
	V	15.28	22.80	20.56
		4.02	3.56	4.22
	CM	14.84	23.04	19.76
		4.37	4.49	4.33
	A	15.32	21.36	20.56
		3.39	6.06	5.82
	AP	16.56	25.08	21.76
		4.22	4.07	4.49
	P	13.92	21.72	19.16
		4.13	4.98	4.06

a Mean Score b Standard Deviation

CC Closed Captioned V Video Only CM Muted Closed Captioned

A Audio AP Audio & Printed Text P Printed Text

		Treatment					
		CC	V	AP	CM	A	P (control)
Group	DS	1	2	3	4	5	6
	R	7	8	9	10	11	12

Figure 1: Grouping Chart

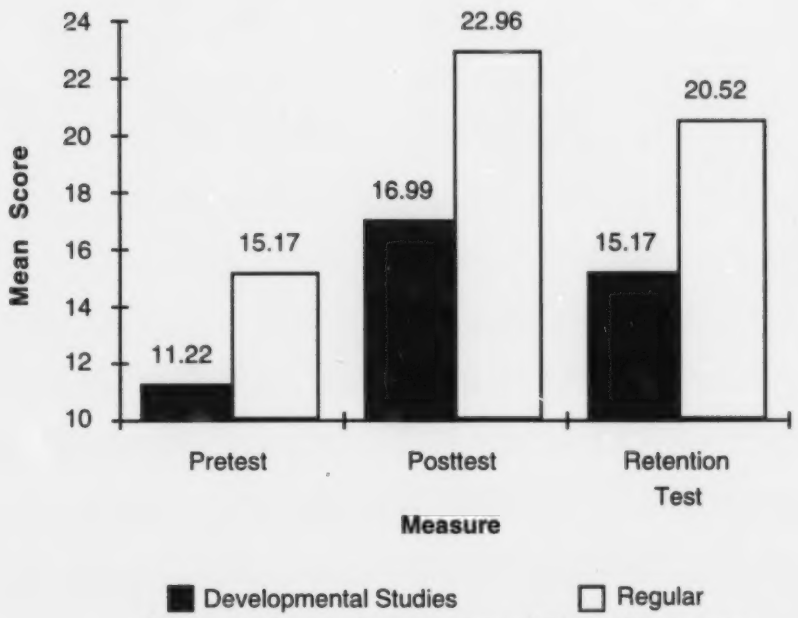

Figure 2: Group Comparison of Three Measures

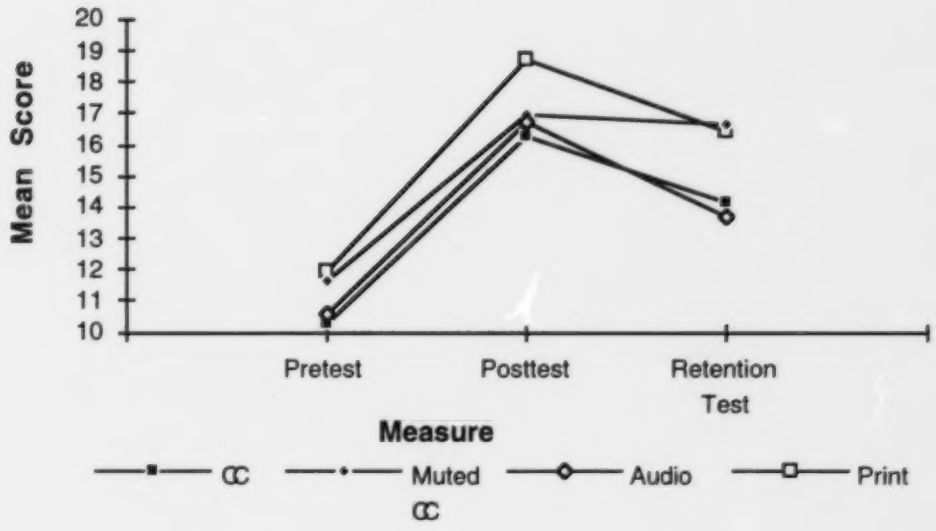

Figure 3: Treatment Comparison of Developmental Studies Students' Measures

Author Identification Notes

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